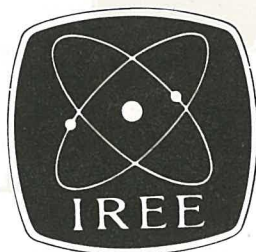


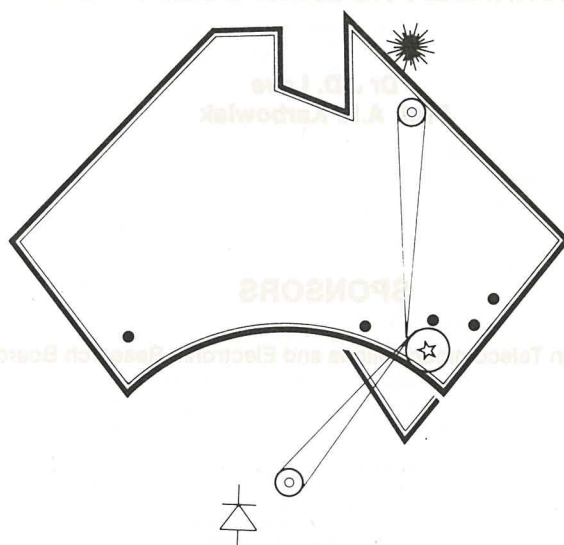
11th AUSTRALIAN CONFERENCE ON OPTICAL FIBRE TECHNOLOGY



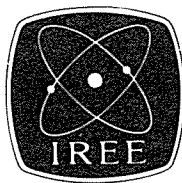
DECEMBER 1-4, 1986

GEELONG AUSTRALIA

PROCEEDINGS



The Institution of Radio and Electronics Engineers
Australia
Commercial Unit 3
2 New McLean Street
Edgecliff, NSW 2027
(02)327 4822



11th AUSTRALIAN CONFERENCE ON OPTICAL FIBRE TECHNOLOGY

CONFERENCE COMMITTEE

Director:	Dr R. Horton	Telecom Australia
Treasurer:	Mr A.J. Gibbs	Telecom Research Laboratories
IREE Representatives:	Mrs H. Harriman	IREE Executive Director
Committee:	Dr J.D. Love	Australian National University
	Prof. A.E. Karbowiak	University of New South Wales
	Mr P.A. Lazarou	Siemens Limited
	Mr B.C. Wright	Olex Limited
	Dr M.W. Austin	RMIT
	Dr P.V.H. Sabine	Telecom Research Laboratories

TECHNICAL PROGRAM COMMITTEE:

Dr J.D. Love
Prof. A.E. Karbowiak

SPONSORS

Australian Telecommunications and Electronic Research Board

CONTENTS

1... Technical Programme	v-x
2... Index of Authors	xi
3... Papers	1- 228

11th AUSTRALIAN CONFERENCE ON OPTICAL FIBRE TECHNOLOGY

FOREWARD

Since their inception, in 1976, as an annual workshop (under the auspices of the Radio Research Board) for interested parties in the optical communications field, meetings of the optical fibre technology community have matured to the status of a fully-fledged Conference which now carries significant status on the industry's calendar of important yearly events. Matters under consideration have also expanded to cover the whole range of conception to innovation, with the added benefits of timely exhibits from the industry.

The growing importance of optical fibre communications cannot be underestimated. It is of vital importance to future network developments, if Australia is to maintain a competence and compatibility with worldwide trends. The capacity to absorb and apply advances in information technology at large will be greatly enhanced by the transport capabilities of an optical communications infrastructure which will lay the foundations for enhanced business efficiency and social benefits of technology.

In the manufacturing arena, optical communications technology provides an opportunity for companies to establish a foothold in a high growth market, at a time when Australia's economic structure is under pressure for change. The shrinking of traditional trading markets has underscored the need for the manufacturing sector to adopt an enhanced role in the creation of national wealth and prosperity on the world scene.

In this context, ACOFT provides a valuable forum for the exchange of current ideas and information, and a unity of thinking which will guide us forward into a challenging and optimistic future. To this end, the Committee is extremely grateful to the participating authors, from within Australia and overseas. Their efforts are the cornerstone of a successful Conference, and they have been ably blended and massaged by the experienced hands of my colleagues Dr. Love and Prof. Karbowiak on the Technical Programme Sub-Committee.

As the Secretary of the first annual optical workshop, and the Director of the present Conference, it gives me great pleasure to reflect on the growth in content and direction of these annual events. Wearing my second hat as a IREE Councillor, I am proud that the IREE was, along the way, selected to take the erstwhile burden of adding formal structure and organisation to the meetings as they developed to the Conference status we now have.

In the lead up to the Conference, my task as Director has been greatly simplified and made pleasurable by a talented Committee, which is listed elsewhere in these Proceedings. Administrative arrangements have been the carriage of Mrs Heather Harriman and Miss Cherie Morris, of the Institution, who will be in attendance at the Conference.

I sincerely hope you have an enjoyable and rewarding Conference.

R. Horton
Director, ACOFT

AUSTRALIAN CONFERENCE ON OPTICAL FIBRE TECHNOLOGY (ACOFT) 1986 — PROGRAM

Monday, December 1, 1986

0900 — 0930

Opening Session

Address by M.K. Ward
Managing Director, Telecom Australia

0930 — 1050

Infrared Fibres

Extrinsic Scattering Losses in Heavy Metal Fluoride Glasses: Vacuum Bubble Occlusions

D.R. MacFarlane, J.F. Conway, L.T. Moore and P. McNamara
Monash University

Preparation of Multi-Element Mid-IR Fibre Samples for Detailed Element Profile Analysis

Y. Ito and T. Warminski
Telecom Australia Research Laboratories

Fluoride-Glass Compositions as given by the EPMA-Technique

T. Warminski
Telecom Australia Research Laboratories

Limitations due to Self-Phase Modulation on Future Optical Fibre Transmission Systems

F.F. Ruhl
Telecom Australia Research Laboratories

1050 — 1120

MORNING TEA

11.20 — 11.50

Invited Paper

The Application of Optical Fibre in Telecom's Digital Transmission Network

N.R. Crane
Telecom Australia Headquarters

1150 — 1250

Transmission Systems I

The In-Service Reliability of Optical Fibre Transmission Systems in the Telecom Australia Network

K.R.E. Lierse
Telecom Australia, Line Transmission Systems Support Section

Statistical Design of Long Optical Fibre Routes

T.J. Batten, A.J. Gibbs, S. Hawkins and G. Nicholson
Telecom Australia Research Laboratories

Recent Progress in Long-Span Fibre Communications

D.A. Frisch
Overseas Telecommunications Commission (Australia)/British Telecom Research Laboratories

1250 — 1420	LUNCH
1420 — 1520	Transmission Systems II Optical Transmission at 2, 8 and 34 Mbit/s D.J. Morris Standard Telephones and Cables Pty Ltd Analysis of Initial Data and In-Service Experience of Queensland Railway's Optical Fibre Based PCM Telecommuni- cations Network P. Angus and J. Wimberley Queensland Railways
1520 — 1550	AFTERNOON TEA
1550 — 1630	Couplers Understanding 6-port Couplers A.J. Stevenson and J.D. Love Australian National University Finite-Element Analysis of Fused Couplers X. Zheng Australian National University
1630 — 1730	Nonlinear Effects Solitons and Loss in Single Mode Optical Fibres C. Desem and P.L. Chu University of New South Wales Effect of Amplitude Modulation on Stimulated Brillouin Scattering M.J. Joyce Telecom Australia Research Laboratories Non-Linear Effects in Optical Fibres A. Vatarescu Australian National University

Tuesday, December 2, 1986

0900 — 1020	Integrated Optics The Fabrication of a Diffraction Grating in an Ion-Exchanged Waveguide J.G. Wyatt, M.A. Jarnyk and M.W. Austin Royal Melbourne Institute of Technology Fabrication of an Optical Phase Modulator R.A. Pattie and M.W. Austin Royal Melbourne Institute of Technology
-------------	---

0940 — 1020	Integrated Optics (Contd)
	Design Investigations for Single-Mode Optical Couplers M.J. Millington and P.S. Chung Department of Defence, Canberra/Chinese University of Hong Kong
	Analysis of Coupling Efficiency between GaAs/GaAlAs Rib Waveguides and Single-Mode Fibre M.W. Austin and R.A. Pattie Royal Melbourne Institute of Technology
1020 — 1050	Invited Paper
	The Strategic Importance of Optical Fibre Communications Research H.S. Wragge Director, Telecom Australia Research Laboratories
10.50-11.20	MORNING TEA
11.20-12.40	Fibre Theory
	Metal-Coated Fibre Polarizer W.M. Henry, A. Ankiewicz and J.D. Love Australian National University
	A Numerically Efficient Means of Solving the Characteristic Equations of Guiding Structures J.D. Cashman Australian Defence Force Academy
	Single Polarization Optical Fibres using Tilted Stress Axes A. Ankiewicz and A.W. Snyder Australian National University
	Single Mode Fibres Operating at Few Mode Wavelengths S.J. Garth, C. Pask and R.A. Sammut Australian Defence Force Academy
1240 — 1410	LUNCH
1410 — 1530	Local Area Networks (LANs)
	Optical Fibre Systems for the Customer Access Network I. McGregor, B.M. Smith, B.R. Clarke and G.J. Semple Telecom Australia Research Laboratories
	Trends in Intelligent Building Development K. Kumagai Sumitomo Electric Industries, Japan
	Distributed Design and Optical Realisation of XLNET A.E. Karbowski, P.L. Chu, G. Anido, T. Whitbread, P.M. Allen and S.Z. Wang University of New South Wales
	The QPSX Metropolitan Area Network J.L. Hullett University of Western Australia

1530 — 1600 **AFTERNOON TEA**

1600 — 1620 **Optical Time Domain Reflectometry (OTDR)**
A Comparative Analysis of a Spread Spectrum (SS) OTDR
M. Friedgut
AWA Technology Division

1620 — 1720 **Lasers I**
Towards a Technology for Long-Life-Times of Optoelectronic Devices
H. Hartnagel
Technische Hochschule Darmstadt, West Germany

Investigation of the Spectral Variations during Laser Pulses
P.S. Atherton and D.A. Frisch
Overseas Telecommunications Commission (Australia)/British Telecom Research Laboratories

An Investigation of the Spectral Characteristics of a Commercially Available Semiconductor Laser
M.W. Lawson
University of New South Wales

Wednesday, December 3, 1986

0900 — 1040 **Coherent Systems**
A 301km Transmission Experiment on an Optical FSK Heterodyne Detection System using DFB Laser Diodes
K. Emura, S. Yamazaki, M. Shikada, I. Mito and K. Minemura
NEC Corporation, Japan

ASK Coherent System with a 6-Port Fibre Coupler at the Receiver
G. Nicholson
Telecom Australia Research Laboratories

Coherent Optical Communication System Experiments
T.D. Stephens
Telecom Australia Research Laboratories

Semiconductor Optical Amplifiers for Coherent Systems
D.J. Bakewell
Telecom Australia Research Laboratories

Optical Sources for Coherent Optical Fibre Communication Systems
J.L. Adams
Telecom Australia Research Laboratories

1040 — 1110 **MORNING TEA**

1110 — 1140 **Invited Paper**
Optical Communications: The Doorway to the Information Era
B. Catania
CSELT, Italy

1140 — 1240

Lasers II

InGaAs/InP pin and Avalanche Photodiodes for Optical Fibre Communication in the 1-1.6 μm Wavelength Range

R. Trommer

Siemens Research Laboratories, West Germany

4 Gbit/s Optimised GaAs MESFET Optical Amplifier

R.A. Minasian

University of Melbourne

The Effect of Gain Suppression on Frequency Noise in Laser Diodes

K. Hinton and G. Nicholson

Telecom Australia Research Laboratories

1240 — 1410

LUNCH

1410 — 1450

Marketing and Standards

Issues and Trends in the United States of America Fibre Optic Marketplace

A.W. McCulley

Rockwell International USA

Fibre Optics, Computer Industry Trends and International Standards

B.A. Kelton

Buyero Pty Limited

1450 — 1530

Fibre Production

OVD Technology in Australia

T.D. Croft

Optical Waveguides Australia Pty Limited

The First Experience in the Mass Production of Optical Fibre in Australia

M. Sasagawa, M. Carter, H. Mukunashi and R. Finlay

Optix Australia

Thursday, December 4, 1986

0900 — 1040

Sensors I

Fibre Optic Sensing Systems

M.C. Elias, P.G. Jacob, D. O'Brien and S.C. Rashleigh

Australian Optical Fibre Research Pty Ltd

Fibre Optic Sensors for Multiplexed Systems

P.R.A. Lyons, P.G. Jacob, M.R. Harris, M.C. Elias and S.C. Rashleigh

Australian Optical Fibre Research Pty Ltd

A Comparison of Two Fibre Optic Lever Sensor

P.L. Chu, P. M. Allen and T. Whitbread

University of New South Wales

1000 — 1040	Sensors I (Contd) <p>The Use of Optical Fibres in a System to Monitor the Temperature of High Voltage Power Lines</p> <p>P.L. Arlett and M.E. Bialkowski James Cook University of North Queensland</p> <p>Optical Fibre Sensor using Modal Noise Effect</p> <p>Xianda Dai, P.L. Chu and K.S. Chiang University of New South Wales</p>
1040 — 1110	MORNING TEA
1110 — 1150	Sensors II <p>Simple Double Reflection Fibre Optic Probe for On-Line Spectroscopy</p> <p>P.J. Samson B.H.P. Central Research Laboratories</p> <p>A Novel Two-Colour Fibre Optic Spot Pyrometer</p> <p>D.A. Thorncraft, D. O'Brien, M.C. Elias and S.C. Rashleigh Australian Optical Fibre Research Pty Ltd</p>
1150 — 1250	Cables <p>Installation of Long Haul SMOF Cables in Australia</p> <p>M.J. McKiterick Telecom Australia Network Engineering Department</p> <p>Field Results and Future Trends for Long Haul SMOF Cables in Australia</p> <p>P. Hulbert and R. Hsieh Telecom Australia Network Engineering Department</p> <p>Performance of 1300 nm Optimised Single Mode Fibre in a Non-Metallic Slotted Core Cable</p> <p>L.H. Ding Austral Standard Cables Pty Limited</p>
1250 — 1420	LUNCH
1420 — 1520	Submarine Cables <p>TASMAN — 2 and the Proposed Pacific Network of Submarine Optical Fibre Cable Systems</p> <p>J.E. Phillips Overseas Telecommunications Commission (Australia)</p> <p>Branching for Optical Fibre Submarine Cables</p> <p>B. Seth Overseas Telecommunications Commission (Australia)</p> <p>Electro-optic Design Considerations of an Undersea Repeater at 1550 nm</p> <p>M.W. Lawson AWA Technology Division</p>
1520 — 1530	CONCLUSION

ALPHABETICAL LISTING OF INDEX TO AUTHORS

Adams, J.L.	143	Kumagai, Y.	101
Allen, P.M.	105,185	Lawson, M.W.	123,225
Angus, P.	39	Lierse, K.R.E.	23
Anido, G.	105	Love, J.D.	43,83
Ankiewicz, A.	83,91	Lyons, P.R.A.	181
Arlett, P.L.	189	McCulley, A.W.	161
Atherton, P.S.	119	McGregor, I.	97
Austin, M.W.	63,67,75	McKiterick, M.J.	205
Bakewell, D.J.	139	McNamara, P.	1
Batten, T.J.	27	MacFarlane, D.R.	1
Bialkowski, M.E.	189	Millington, M.J.	71
Carter, M.	173	Minasian, R.A.	153
Cashman, J.D.	87	Minemura, K.	127
Catania, B.	147	Mito, I.	127
Chiang, K.S.	193	Moore, L.J.	1
Chu, P.L.	51,105,185,193	Morris, D.J.	35
Chung, P.S.	71	Mukunashi, H.	173
Clarke, B.R.	97	Nicholson, G.	27,131,157
Conway, J.F.	1	O'Brien, D.	177,201
Crane, N.R.	17	Pask, C.	95
Croft, T.D.	169	Pattie, R.A.	67,75
Dai, Xianda	195	Phillips, J.E.	217
Desem, C.	51	Rashleigh, S.C.	177,181,201
Ding, L.H.	213	Ruhl, F.F.	13
Elias, M.C.	177,181,201	Sammut, R.A.	95
Emura, K.	127	Samson, P.J.	197
Finlay, R.	173	Sasagawa, M.	173
Friedgut, M.	113	Semple, G.J.	97
Frisch, D.A.	31,119	Seth, B.	221
Garth, S.J.	95	Shikada, M.	127
Gibbs, A.J.	27	Smith, B.M.	97
Harris, M.R.	181	Snyder, A.W.	91
Hartnagel, H.	117	Stephens, T.D.	135
Hawkins, S.	27	Stevenson, A.J.	43
Henry, W.M.	83	Thorncraft, D.A.	201
Hinton, K.	157	Trommer, R.	149
Hsieh, R.	209	Vatarescu, A.	59
Hulbert, P.	209	Wang, S.Z.	105
Hullett, J.L.	109	Warminski, T.	5,9
Ito, Y.	5	Whitbread, T.	105,185
Jacob, P.G.	177,181	Wimberley, J.	39
Jarnyk, M.A.	63	Wragge, H.S.	79
Joyce, M.J.	55	Wyatt, J.G.	63
Karbowiak, A.E.	105	Yamazaki, S.	127
Kelton, B.A.	165	Zheng, X.S.	47